UNITED
NATIONS

A

General Assembly

Distr.
GENERAL

A/CONF.164/INF/4
15 June 1993

ORIGINAL: ENGLISH

UNITED NATIONS CONFERENCE ON
STRADDLING FISH STOCKS AND
HIGHLY MIGRATORY FISH STOCKS
New York, 12-30 July 1993

SOME HIGH SEAS FISHERIES ASPECTS RELATING TO STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS

SUMMARY

This paper has been prepared at the request of South Pacific countries. It focuses on the current stock status of straddling fish stocks and highly migratory fish stocks of commercial importance. The paper also addresses reasons for the underlying pressure on high seas fisheries resources. Reference is made to the difficulties created by fleet overcapitalization and continued industry subsidization. The paper concludes that high seas fisheries problems, as they relate to straddling fish stocks and highly migratory fish stocks, stem from increasing fishing effort on stocks that may already be heavily exploited or overexploited, and a lack of internationally agreed management mechanisms to rationalize their exploitation in a sustainable manner.

I. BACKGROUND

1. The present paper has been prepared by the Food and Agriculture Organization of the United Nations (FAO) at the request of South Pacific countries that participated in the organizational session of the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks in New York, April 1993.* The focus of the paper is on those straddling stocks and highly migratory species that are of major commercial importance. The South Pacific countries sought information on a number of specific issues relating to high seas fisheries (see annex I to the present paper). This paper addresses those issues in a very summarized form. A more detailed document on a world review of high seas highly migratory species and straddling stocks is under preparation, and a preliminary version will be made available by FAO (in English only) at the substantive session of the Conference.

2. Fisheries data and information available to FAO relating to straddling fish stocks and highly migratory fish stocks are separated by major fishing areas for statistical purposes. The 1982 Convention on the Law of the Sea (hereafter called the 1982 Convention), article 119 (2), requires States fishing on the high seas to contribute and exchange catch and effort statistics through competent international organizations, whether subregional, regional or global. In accordance with this requirement, States that are members of international fishery commissions usually provide data to the commissions on behalf of their fleets. For straddling fish stocks, data on fishing effort is collected only in the North Atlantic but they are not sufficient for management purposes and are under review. In addition, 100 States report to FAO data relating to fleet size but do not report on the activities of these fleets on the high seas. In fact, only a small number of the countries report on their tuna fleets. Consequently, it is not possible to provide fishing effort information relating to high seas catches of straddling fish stocks or highly migratory fish stocks.

II. OVERVIEW

3. Marine fisheries catches peaked at 86 million metric tons in 1989, and subsequently decreased in 1990, 1991 and 1992. The growth in marine catches over the 1980s principally came from five low-valued species: Alaska pollack, Chilean jack mackerel, Japanese pilchard, Peruvian anchoveta and South American pilchard. Over this period most other high-valued species had reached a production plateau, with the exception of certain small tunas and cephalopod fisheries.

4. Prior to the introduction of extended jurisdiction, FAO estimated that 5 per cent of total marine production was taken beyond 200 miles. However, since that time, the proportion of high seas catches has increased to an estimated 8-10 per cent of the total. This proportional increase is principally

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* See "Report on the organizational session of the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks" (A/CONF.164/9), para. 23.

attributable to higher levels of high seas fishing effort by distant-water fishing nation (DWFN) fleets.

5. Since the adoption of the 1982 Convention, the redistribution of the seas' wealth has proceeded largely as anticipated. Coastal States have gained significantly through extended jurisdiction while some DWFNs have lost access to traditional fishing areas. Consequently, DWFNs have relocated fleets, often to the high seas, or paid for fisheries access to coastal States' exclusive economic zones (EEZs).

6. A number of important developments were not anticipated in 1982 when extended jurisdiction was introduced. These developments included (a) an increase in DWFN capacity rather than a retrenchment of fleets capable of operating beyond 200-mile limits, and (b) the maintained or increased payment of subsidies in order to support the operations of overcapitalized fleets both within exclusive economic zones and on the high seas.

7. The overall impact of these unanticipated fleet-related developments has been to increase fishing effort and pressure on high seas fish stocks. Some of these stocks are not subject to management by international fisheries commissions. Where commissions do exist, some fleets targeting high seas resources are not party to a management convention, while others that are party to a convention opt not to abide by management measures when they are introduced. Under these circumstances flag State enforcement is ineffective and rational resource exploitation, through management, is not fostered.

8. Few flag States have implemented legislation governing the rights and responsibilities of their vessels on the high seas. Where States have enacted controls and become parties to international fisheries commissions, some vessel owners have changed flag to circumvent management measures. The overall effect of reflagging is not well known since States providing flags of convenience to fishing vessels do not report to FAO. However, based on information taken from Lloyd's Register of Shipping, such practices wold involve more than 1,000 vessels, or approximately 20 per cent of the world's fishing vessels greater than 500 gross registered tons (GRT).

III. HIGH SEAS FISHERIES

9. High seas stocks are those stocks that exist beyond national jurisdiction. These stocks include species distributed essentially beyond 200-mile limits, though they may spend periods of their life cycles (e.g., for reproduction or feeding) in areas under national jurisdiction. High seas stocks also include portions of EEZ stocks that extend beyond 200 miles (straddling stocks) and stocks that undertake extensive migrations between exclusive economic zones and high seas areas, across oceans and/or across exclusive economic zones. The types of stocks are illustrated, from a scientific and technical point of view, in annex II to the present paper. In biological terms, and depending on the closeness of their relationships with the sea bottom, high seas resources are neritic or oceanic, with a range of intermediate categories. Annex III depicts these relationships.

10. High seas neritic resources, which can be demersal or pelagic, have their life cycles and distribution largely confined to the continental shelf and upper slope despite the fact that stocks extend into, and may be harvested in, the high seas. Neritic high seas resources are found where extended jurisdiction has not yet been claimed (e.g., in the Mediterranean) or on continental shelves that extend beyond 200 miles (e.g., the Flemish Cap in the North-West Atlantic). Demersal high seas resources are found principally on straddling continental shelves and slopes, and around sea mounts.

11. High seas oceanic resources are distributed mainly beyond the outer continental shelf and/or migrate extensively across the open ocean. According to FAO's database, up to 400 marine species can be considered purely or significantly oceanic (50 species of cephalopods, 40 species of shark, 60 species of marine mammals and 230 species of fish), and contribute to straddling and highly migratory stocks.

12. The biological information available on highly migratory species and their present and potential stocks status is generally poor, except perhaps for some whales and large tunas, whose management and conservation is a matter of international concern. Most oceanic high seas resources are dispersed widely, difficult to harvest economically and extremely difficult to assess. They are usually harvested by DWFN fleets operating in areas where target species concentrate for reproduction or feeding.

13. The biological distinction between straddling fish stocks and highly migratory fish stocks is not always clear. For example, the Chilean horse mackerel, which straddles 1,500 miles off the exclusive economic zones of Chile and Peru, is a particular case of a straddling stock that might, from the biological standpoint, be as highly migratory in nature as some of the smaller tuna listed in the 1982 Convention. Similarly, some smaller tropical tuna species (e.g., skipjack and possibly yellowfin) have limited regional migrations, especially when their lifespans are reduced by fishing.

14. Annex IV shows, based on FAO data, the growth in catches of highly migratory and straddling fish stocks between 1970 and 1991. 1/

A. Straddling fish stocks

15. The 1982 Convention defines straddling fish stocks (article 63 (2)). Under this article States harvesting such stocks shall seek to agree on measures for the conservation of such stocks. 2/

16. In this section of the paper the most commercially important straddling fish stocks, as conventionally viewed (i.e., stocks that straddle out of the exclusive economic zones), are identified and considered on a regional basis. Annex V shows different types of straddling fish stocks.

1. Pacific Ocean

17. The continental shelf in the North Pacific supports fisheries resources that are among the most plentiful in the world. Alaska pollack is widely

distributed (Bering Sea and Sea of Okhotsk) and is a prime straddling stock. Catches by fleets from the United States of America, the former Soviet Union, China, the Republic of Korea and Poland have increased considerably since the 1950s. In the late 1980s annual Alaska pollack catches stood at 6.7 million metric tons. A significant proportion (25-30 per cent) of catches come from the Donut Hole - a high seas enclave in the Bering Sea. Catches are also made in another high seas area, the Peanut Hole (Sea of Okhotsk). 3/ Pollack resources are probably fully exploited and management is a source of controversy.

18. Orange roughly is the main straddling stock found in the South Pacific. It is a long-lived species, reaching maturity at 20-25 years. Because of this and its associated slow growth, cautious management is needed. Fisheries for this species have developed in Australia and New Zealand. The resource is also harvested by fleets from Japan, the Russian Federation, the Republic of Korea and Norway. It is likely that current exploitation rates are unsustainable, though permitted catch levels have been substantively reduced in recent years. However, the effects of overfishing will become apparent only within the next two decades.

19. In the South-East Pacific there is a significant stock of jumbo flying squid. This resource extends from California to the southern tip of Latin America. Current yields are about 19,000 metric tons per annum.

2. Atlantic Ocean

20. In the North-West Atlantic important stocks of cod and a mixture of other bottom fish (principally redfish and flatfish) straddle the exclusive economic zones of Canada, Greenland and countries of the European Economic Community (EEC). These stocks are exploited both by coastal State fleets within their respective exclusive economic zones and by DWFNs on adjacent high seas areas. The resources of this area are covered by the North Atlantic Fishery Organisation (NAFO), which is responsible for management. A number of stocks are severely depleted, and in 1992 NAFO noted that "the groundfish stocks ... are now, generally, in the worst condition they have ever been". Reasons for this situation stem from a combination of climate-related fluctuations of recruitment, an increase in predation of young cod by growing populations of harp seals, a decline of one major food item of the cod (capelin), disagreement on management targets between NAFO contracting parties, inaccurate declarations of catches by non-contracting parties to NAFO and resulting uncertainty in scientific forecasts.

21. In the North-East Atlantic blue whiting is one of the main straddling stocks. Oceanic redfish, cod, haddock and Greenland halibut, as well as pelagic Norwegian spring-spawning herring, are also straddling stocks in this region, which is covered by the International Council for the Exploration of the Sea (ICES) for fisheries research and management advice, while the management mandate lies with the North-East Atlantic Fisheries Commission (NEAFC) and the EEC. The blue whiting, heavily fished in the late 1970s, yielded some 360,000 metric tons in 1991. Exploitation at this level is considered to be within safe biological limits.

22. In the Eastern Central Atlantic most catches are taken within areas of extended jurisdiction because of the relatively narrow continental shelf, including small pelagic species such as sardine, sardinella, mackerel, horse mackerel and tropical tunas. The oceanic horse mackerel is the only known straddling stock in the area, and it is caught mainly by Eastern European fleets. Little information is available concerning its status and potential.

23. Flying fish, dolphin fish, wahou, blackfin, yellowfin, skipjack, Atlantic sailfish, white marlin, blue marlin and king mackerel occur as straddling stocks in the Western Central Atlantic. In the 1950s and 1960s these stocks were targeted by Japanese vessels and in the 1970s other DWFN fleets from the Republic of Korea, Taiwan Province of China and Venezuela joined the fishery. Extended jurisdiction has enabled Caribbean island States to improve control over resource access and use.

24. In the South-East Atlantic the continental shelf is narrow and all reported catches are apparently taken within exclusive economic zones. No straddling stock conflict is reported. It is unlikely that large demersal straddling stocks could occur in this region but the possibility exists for large and small pelagics (e.g., horse mackerel).

25. In the South-West Atlantic the continental shelf and slope extends well beyond the outer limit of Argentina's exclusive economic zone, where important pelagic and demersal straddling stocks occur. These stocks include short-fin squid, hake, southern blue whiting and grenadier. The Patagonian Shelf is the principal fishing ground for short-fin squid and catches (including common squid) were 550,000 metric tons in 1990. High seas catches for these stocks are not available. They are harvested by DWFN fleets primarily from the Republic of Korea, the former Soviet Union, Japan, Taiwan Province of China and Spain. Both short-fin squid and common squid stocks are considered to be overexploited in the Patagonian Shelf area.

26. The hakes are the most important demersal fish stocks in the South-West Atlantic. These species are found within areas of national jurisdiction on the outer continental shelf as well as on the Patagonian slope. The combined catches of the major demersal species are around 425,000 metric tons per year. They are principally harvested by Argentinean and Uruguayan fleets together with DWFN fleets (Spain and Japan). These stocks are considered to be fully exploited. In 1990 DWFN fleets from Poland, Japan and the former Soviet Union also harvested 194,000 metric tons of southern blue whiting. A large proportion of this catch was taken on the high seas. This stock is considered to be underexploited.

3. Mediterranean Sea

27. Coastal States in the Mediterranean have not declared extended jurisdiction and, as such, the Mediterranean Sea remains a high seas area. Demersal straddling stocks are found and are problematic in the Gulf of Lions and the Gulf of Gabes. Hake and deep sea shrimps are the main target species. Pelagic straddling stocks exist probably everywhere. In these areas the continental shelf extends beyond 12 miles and stocks occurring on the shelf are therefore accessible to other fishermen from within and outside the region.

4. General

28. It can be generally concluded that many demersal straddling fish stocks exploited on high seas continental shelf areas (i.e., conventional straddling stocks) are fully fished, if not overfished. In some cases the exploitation of these resources has led to controversy (e.g., Grand Banks cod and Alaska pollack). The situation of straddling pelagic stocks is less understood. Large pelagic species also represent important straddling stocks for island countries. Technological developments are likely to facilitate the exploitation of some of these species (e.g., dolphin fish, flying fish and large tuna-like species) by island countries. These species are currently assumed to be underexploited.

29. Demersal high-value straddling stocks have suffered from overfishing and the situation is unlikely to improve unless innovative solutions are found and political resistance is overcome to put in place systems to collect data, promote collaborative stock assessment and elaborate and enforce international management measures. Limitations on exploitation through fishing effort controls are required and in some cases sophisticated management arrangements may be required to deal with sequential fisheries. 4/

B. Highly migratory fish stocks

30. Highly migratory species are referred to in the 1982 Convention (article 64). No operational definition of "highly migratory species" is given, though a species listing is provided in annex I to the Convention. The list includes 9 species of tuna, 12 species of billfish, 2 tuna-like species, 4 species of sauries, pomfrets, dolphin fish, oceanic sharks and cetaceans. The listing contains species with a wide geographic distribution, both within and outside exclusive economic zones. The species are pelagic, often with neritic and oceanic phases in their life cycles. Since the late 1970s when the list was drawn up, additional information on certain species has become available, and from a scientific and technical point of view, the list is unsatisfactory. This will remain the case until an appropriate definition of "highly migratory species" is developed or the species listing in annex I is updated.

31. The 1982 Convention (article 64) states that international cooperation is required to manage highly migratory fish stocks in order to promote conservation and optimum utilization. 5/ However, a trend has developed where coastal States (e.g., those of the South Pacific, the Indian Ocean and off West Africa) and DWFNs (e.g., France and Spain through the European Community, Japan,the Republic of Korea, Taiwan Province of China and the United States), through bilateral and multilateral licensing agreements, have entered into arrangements for the exploitation of highly migratory stocks within the coastal States' exclusive economic zones and, in one instance, even for stocks in the adjacent high seas.

32. Tunas are commercially the most highly migratory species, and most licensing arrangements between coastal States and DWFNs focus on the harvesting of these resources, and in particular bluefin, bigeye, yellowfin, albacore and skipjack. They are largely harvested by four gear types: purse seining, longlining, pole and lining, and trolling. Tuna fleets are truly international in character and are highly mobile between fishing grounds.

33. Depending on species and method of capture, tuna are either directed to Japan's sashimi market or canned for consumption in developed countries (e.g., Western Europe and the United States). According to FAO data, 90 per cent of canned tuna is produced in developing countries, while the same proportion is consumed in developed countries. This situation highlights the importance of the status of tuna stocks to both groups of countries.

34. Annex VI to the present paper shows 1991 catches of tuna (principal market species) listed in article 64 of the 1982 Convention, which in 1991 totalled 3.5 million metric tons. It is notable that the bulk of production comes from a small number of countries, and most significantly, from Japan. In 1991 the total value of tuna catches at firsthand sales was US$ 7,600 million. Annex VII indicates that three species (yellowfin, bigeye and skipjack) accounted for 75 per cent of the value of catches (landed value), with each of these species contributing equal proportional shares.

35. The Pacific Ocean is the most important production area for tuna (66 per cent), followed by the Indian Ocean (18 per cent) and the Atlantic Ocean (16 per cent). The Pacific Ocean yields some 71 per cent of world skipjack catches, 66 per cent of yellowfin, 58 per cent of bigeye and 53 per cent of albacore. The central and western areas of the Pacific Ocean account for the largest share of the ocean's total catch, the bulk of which (estimated to be 90 per cent of the total catch) is taken in the adjoining exclusive economic zones of Pacific Island coastal States.

36. Annex VII summarizes the status of tuna stocks by ocean. It is generally concluded that some tuna stocks remain in a healthy condition with relatively low to moderate levels of exploitation (e.g., skipjack in all oceans and yellowfin in the Central and Western Pacific Ocean). Other stocks are under more severe fishing pressure (e.g., yellowfin in the Eastern Pacific and Atlantic oceans). Some stocks are being exploited beyond their maximum sustainable yield level (e.g., northern bluefin in the Mediterranean Sea, and albacore, and possibly bigeye, in the South Atlantic Ocean). Some tuna stocks are considered depleted (e.g., northern bluefin and southern bluefin in the Atlantic Ocean). The status of yellowfin in the Western Atlantic Ocean and northern bluefin in the Pacific Ocean are largely unknown. The tuna and tuna-like stocks (e.g., slender tuna) of the Antarctic Ocean are practically virgin. The remaining stocks can be classified as heavily to fully exploited.

IV. ECONOMIC CONSIDERATIONS

37. It is only possible to comment generally on the size of the world's fishing fleet. It is not possible to provide data relating to fleets that principally or exclusively exploit straddling fish stocks and highly migratory fish stocks, either within exclusive economic zones and/or on the high seas. Furthermore, States do not report catches by gear type. Analysis is complicated by the mobile nature of many high seas fleets between fishing grounds, gears and stocks.

38. Between 1970 and 1990 the world's fishing fleet increased at a rate of twice the rate of increase in world marine catches. This situation has profound implications for the economic well-being of the fishing industry and the

sustainability of fisheries resources because excess fleet capacity has reached alarming proportions. Currently, to achieve an economic rate of return to capital invested in fleet (assuming a rate of 10 per cent per annum), 46 per cent of the annual total value of marine fisheries production (calculated on a landed value basis) would need to be allocated to this purpose. Moreover, it is estimated that, to return to the 1970 catch rate per vessel, removal of at least 30 per cent of the existing tonnage in the world's fishing fleet would be required.

39. The excessive build-up in fleet capacity has resulted from many States not paying due attention to declining stocks within their exclusive economic zones and a failure to implement appropriate controls over fleet size. Indeed, those States that did take such action at an early stage, and recognized the difficulties experienced by their fleets as a result of declining catches from within areas of national jurisdiction, entered into bilateral and multilateral licensing agreements for their fleets in the exclusive economic zones of other coastal States. In addition, States with excess fleet capacity provided substantial subsidies for shipbuilding and other fishing inputs such as fuel and gear. This has led to a situation where fishing fleet subsidies are estimated at US$ 54,000 million per year. Such subsidies have enabled these fleets to continue operations when, under normal circumstances, such operations would not have been financially viable. 6/ However, it should be recognized that through demonstration and related effects, the operation of these fleets may have, in some instances, contributed to technology transfer and, thereby, the strengthening of national fishing capacity in some developing countries.

V. CONCLUSION

40. In essence, the high seas fisheries problem, as it relates to straddling stocks and highly migratory fish stocks, stems from increasing fishing effort on stocks (principally from DWFN fleets) that may already be heavily exploited or overexploited, and a lack of internationally agreed management mechanisms to rationalize their exploitation, and in particular to agree on overall exploitation limits and resource allocation. Fishing by non-contracting parties to management conventions undermines efforts to obtain sustainability.

41. There are a large number of fish stocks that are, by their nature, straddling stocks. Access to these resources and their management have been controversial. Some of these stocks are commercially very valuable, and the lack of agreed management measures has led to their overexploitation and, in some instances, to the introduction of fishing moratoriums.

42. With respect to highly migratory stocks, and in particular tuna, available information suggests that the longest-lived species , which require the most careful management, are either overexploited or depleted, while stocks of the species with the shortest life-span are still in a relatively robust condition.

43. High seas fleet overcapacity and the subsidization of operations have generally exacerbated management difficulties for straddling fish stocks and highly migratory fish stocks. The payment of subsidies has masked the real cost of fishing, leading to irrational exploitation. This situation points to the need for a code of conduct on responsible fishing. FAO was requested at the

twentieth session of the Committee on Fisheries to elaborate such a code, and the Fisheries Department is currently engaged in this task. 7/

Notes

1/ Highly migratory stocks: catches of these species are listed in the 1982 Convention, excluding cetaceans;

Straddling stocks: total catches of species known or susceptible to straddle beyond 200 miles. These estimates are very crude and tentative and should be taken with caution.

2/ Article 63 (2) of the 1982 Convention states:

> "2. Where the same stock or stocks of associated species occur both within the exclusive economic zone and in an area beyond and adjacent to the zone, the coastal State and the States fishing for such stocks in the adjacent areas shall seek, either directly or through appropriate subregional or regional organizations, to agree upon the measures necessary for the conservation of these stocks in the adjacent area."

3/ According to a report in May 1993 by the Russian Fisheries Committee, the Russian Federation has requested the suspension of fishing in the central part of the Sea of Okhotsk (i.e., the Peanut Hole, which accounts for less than 3 per cent of the sea's area) for both Russian and foreign vessels until an international agreement is put in place. In 1991 fleets, mostly from Poland, China and the Republic of Korea, harvested some 700,000 metric tons of pollack in the Peanut Hole. In 1992, the catch could have been as high as 1 million metric tons. The Russian-led moratorium is due to the "catastrophic" impact that fishing in this area has had on national catches within Russia's exclusive economic zone (2 million metric tons in 1991 as opposed to 1 million metric tons in 1992).

4/ Sequential fisheries involve resources that are sequentially exploited by different fisheries at successive stages of their life cycle.

5/ Article 64, paragraph 1, of the 1982 Convention states:

> "1. The coastal State and other States whose nationals fish in the region for the highly migratory species listed in annex I shall cooperate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone. In regions for which no appropriate international organization exists, the coastal State and other States whose nationals harvest these species in the region shall cooperate to establish such an organization and participate in its work."

6/ It may be remarked here that subsidies are not unknown in the agricultural sector as well. It has been estimated that countries of the Organisation for Economic Cooperation and Development (OECD) provide financial support to their agriculture of US$ 320,000 million annually.

7/ An information paper on this subject will be made available by FAO at the Conference.

Annex I

STATEMENT OF THE GROUP OF SOUTH PACIFIC COUNTRIES TO THE ORGANIZATIONAL SESSION OF THE INTERGOVERNMENTAL CONFERENCE ON STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS

On behalf of the group of South Pacific countries (SOPAC) I would like to make some suggestions as to the inputs which could be sought in advance of the July session to assist the work of the Conference.

As recognized in General Assembly resolution 47/192 of 22 December 1992, FAO and regional and subregional fisheries organizations have a special role to play in contributing to the work of the Conference. It may be useful for this organizational session to identify specific reports or types of information which could be requested from specific organizations as input to the July session.

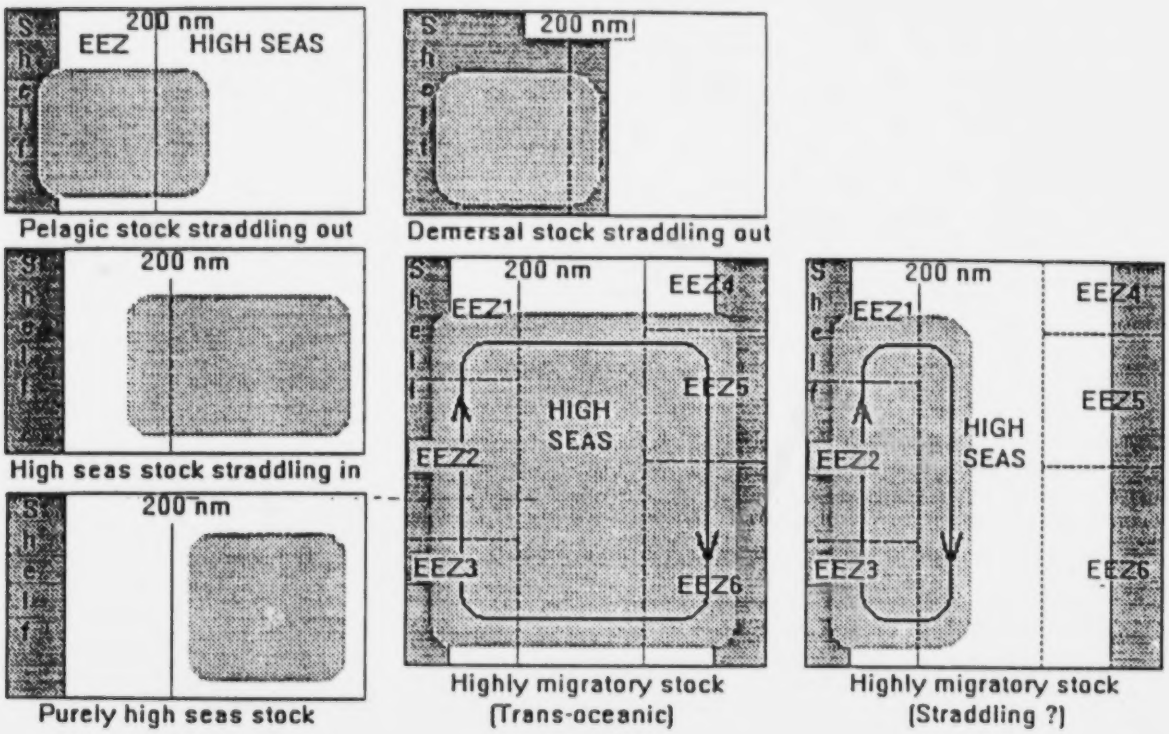
FAO has done much valuable work in technical assessments on key fisheries issues. For this reason, we suggest that specific papers be sought from FAO for this Conference. FAO should be requested to prepare an updated report summarizing the characteristics of the main high seas fisheries, covering details of current stock status, characteristics of the fleets operating in the fisheries and recent trends in catch and effort.

Recent work by FAO analysing the overall economic performance of the world's industrial fishing fleets has proved useful in identifying some of the major problems underlying the pressure on high seas fishery resources. FAO could be asked to update these analyses, including a comparison of global returns from the catching sector and its operating and capital costs.

The Secretariat could also request from all regional and subregional fisheries organizations a report outlining activities of relevance to the subject-matter of this Conference, seeking, in particular, input from those organizations in relation to the areas identified in paragraph 2 (a), (b) and (c) of resolution 47/192.

Annex II

TYPES OF HIGH SEAS RESOURCES



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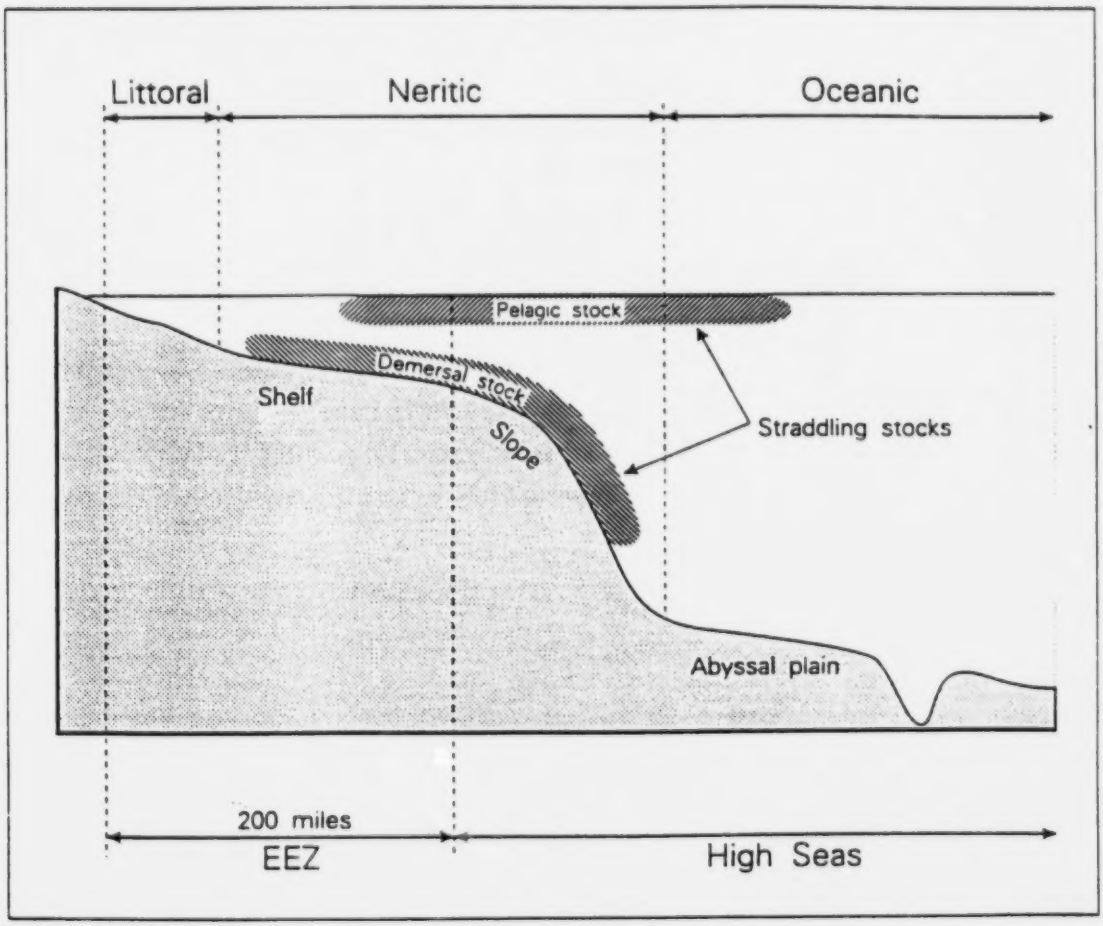
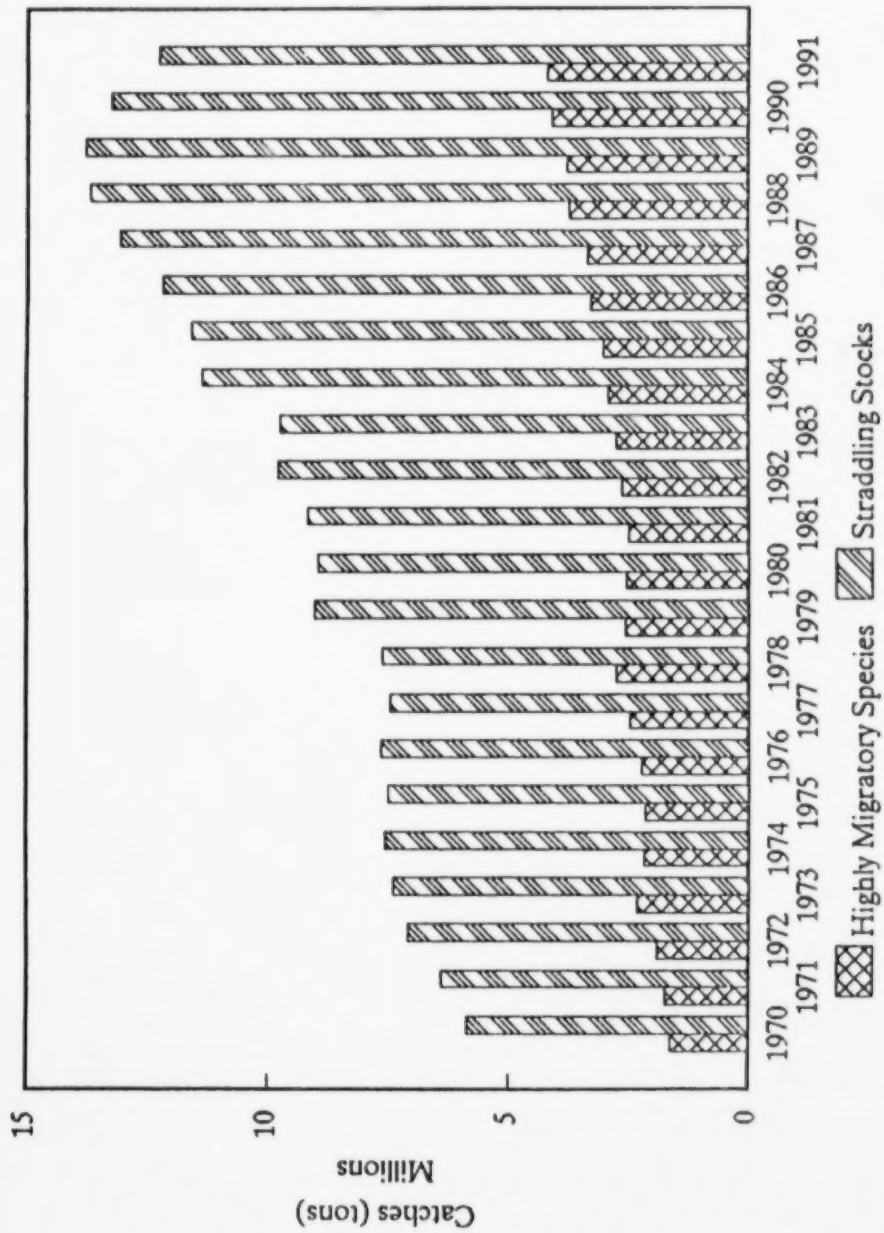
Annex III

BIOLOGICAL AND LEGAL TERMINOLOGY
(case when the shelf extends beyond 200 miles, not to scale)



Annex IV

CATCHES OF HIGHLY MIGRATORY SPECIES AND STRADDLING STOCKS



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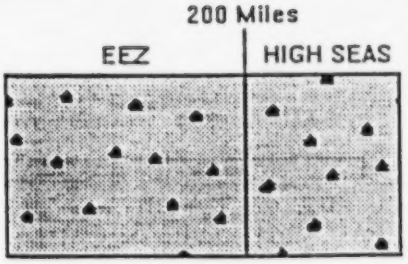
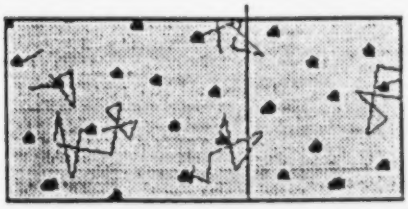
Annex V

DIFFERENT TYPES OF STRADDLING STOCKS



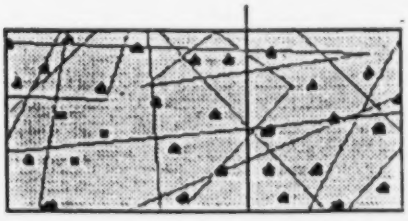
Sedentary stocks with no movement and no mixing

Resource may be fixed (coral) or buried (clams).
The entire stock belongs to the coastal State.
Each compartment may be managed separately but depletion of spawners in one compartment may affect the other.



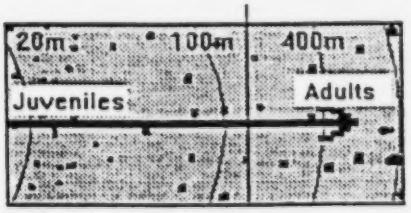
Low diffusion stock, little movement and little mixing

Stock compartments could be managed separately with little error. Depletion of spawning stock in one compartment may affect reproduction in the other.



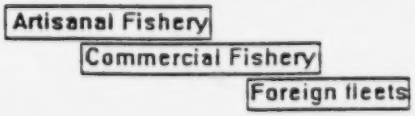
High diffusion stock. Extensive random Movements and important mixing

Stocks must be managed as one unit. Management must be identical on both sides. Mismanagement of one of the compartments will directly affect the other

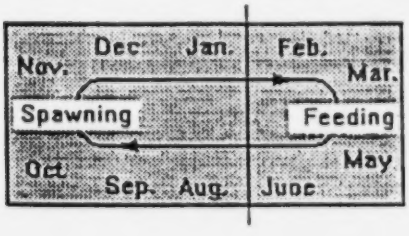


Inshore-offshore ontogenic migrations

The stock must be managed as one single unit.
Specific measures (quotas, mesh size, effort controls) may be area-specific



To be managed as sequential fisheries



Seasonally migrating stock

The stock must be managed as a single unit.
Seasonal patters must be taken into account.

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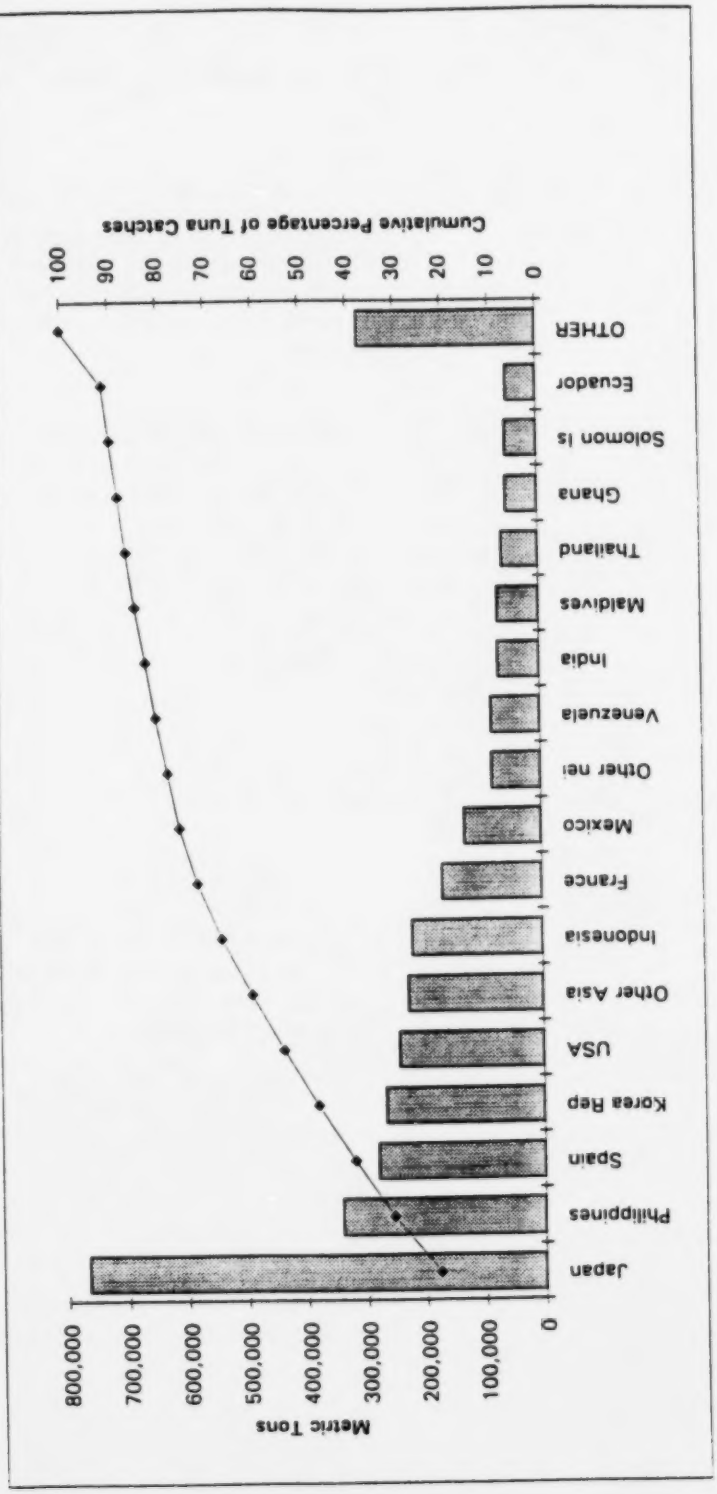
Annex VI

1991 Catches of Tunas Listed in Annex 1 of the 1982 Convention

and Cumulative Percentage of Total Catches for Same Species

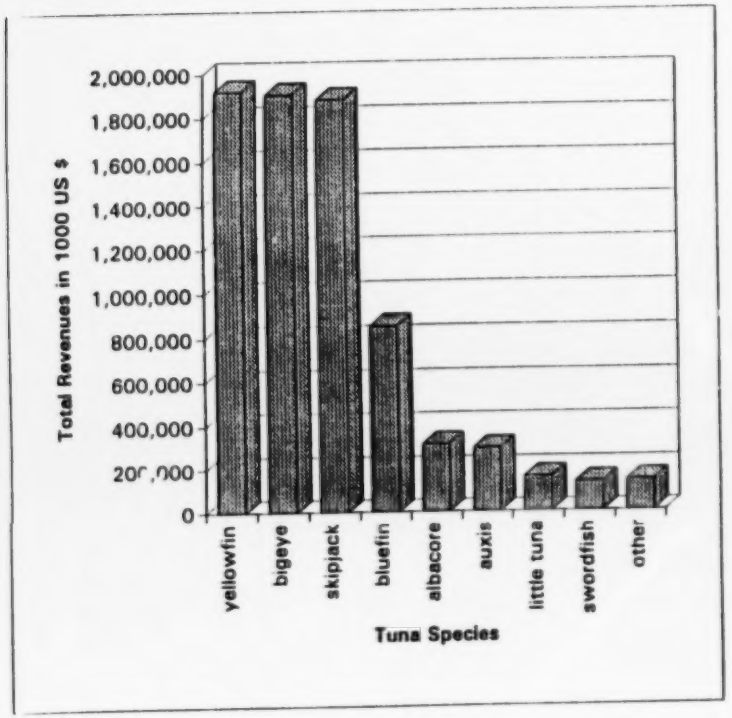


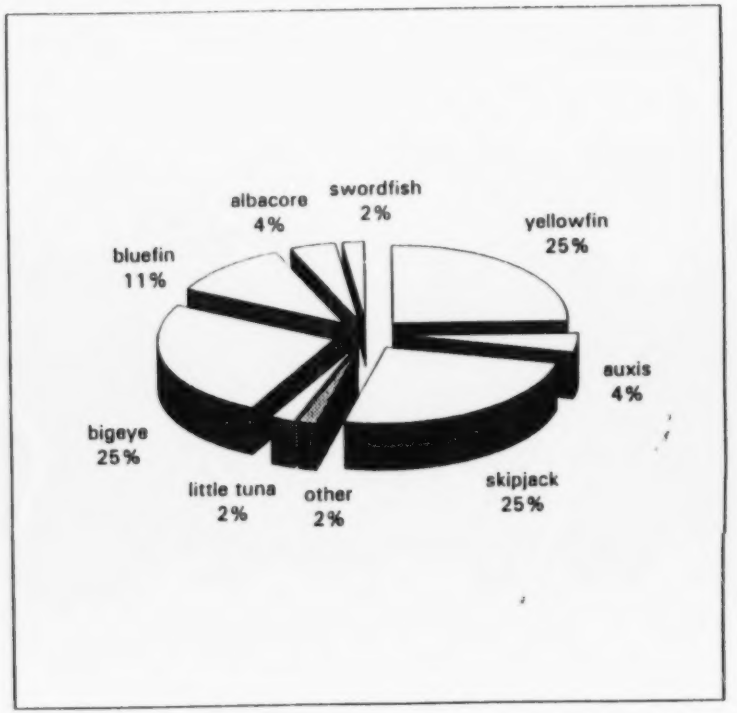
Tuna catches total = 3,478,037 metric tons.

Annex VII

1991 Total Revenues to Tuna Fleets by Species

and Percentage to the Total for Same Species





Total revenues are average landed value times quantities caught.

Tuna species are those listed in Annex 1 of the 1982 Convention.

Annex VIII

MAIN TUNA FISHING COUNTRIES, TOTAL CATCHES AND STATE OF EXPLOITATION BY OCEAN AND SPECIES OR SPECIES GROUPS

Ocean	Species	Main fishing countries (1990)	Catches ('000 t)									State of exploitation *
			1970-74	1975-79	1980-84	1985	1986	1987	1988	1989	1990	
Atlantic	Albacore	Spain, Taiwan PC	78	72	64	73	75	64	67	64	69	North: F South: ?O
	Bigeye	Japan, Spain, Portugal, France, Ghana	51	53	66	77	60	49	57	70	65	F or O
	N. bluefin	France, Spain, Italy, Japan	16	23	22	26	21	20	25	23	23	West: D East: O
	Skipjack	Spain, Ghana, France, Brazil	75	85	131	114	115	108	142	115	133	?M
	Yellowfin	Spain, France, Venezuela, Taiwan PC	86	124	142	148	133	136	130	155	159	East: F West: ?
	Billfishes and swordfish	Spain, Italy, USA, Algeria, Japan	21	21	29	42	41	45	52	54	51	Blue & white marlin: F Sailfish: O Swordfish: O
Total principal tunas, billfishes and swordfish			327	378	454	480	445	422	473	481	500	
Small tunas and seerfishes		Turkey, Mexico, Ghana, Senegal	88	86	121	100	86	106	120	108	112	
TOTAL ATLANTIC OCEAN			415	464	575	580	531	528	593	589	612	

Symbols: ? - uncertain or unknown, L - lightly exploited, M - moderately exploited, F - mainly to fully exploited, O - overexploited and D - depleted

Ocean	Species	Main fishing countries (1990)	Catches ('000 t)									State of exploitation
			1970-74	1975-79	1900-84	1985	1986	1987	1988	1989	1990	
Pacific	Albacore	Taiwan PC, Japan, USA, Korea (Rep. of)	121	118	104	105	108	110	116	162	124	North: F South: F
	Bigeye	Japan, Korea (Rep. of)	83	125	111	124	150	150	121	128	150	F
	N. bluefin	Japan, USA,	20	19	19	11	14	12	6	9	6	?
	Skipjack	Japan, USA, Philip., Indonesia, Taiwan PC	395	506	666	661	815	756	935	868	885	M
	Yellowfin	Mexico, USA, Japan, Philip. Indonesia	300	390	400	476	542	602	586	627	648	East: F Center & west: L
	Billfishes, swordfish	Japan, Taiwan PC	59	60	62	57	66	73	76	76	81	Swordfish: M
Total principal tunas, billfishes and swordfish			978	1278	1362	1434	1695	1703	1840	1870	1894	
Small tunas and seerfishes		Indonesia, Philip., Japan, Thailand, Korea (Rep. of)	340	369	532	627	641	695	815	874	918	
TOTAL PACIFIC OCEAN			1318	1647	1894	2061	2336	2398	2655	2744	2812	

Symbols: ? - uncertain or unknown, L - lightly exploited, M - moderately exploited, F - mainly to fully exploited, O - overexploited and D - depleted

Ocean	Species	Main fishing countries (1990)	Catches ('000 t)									State of exploitation
			1970-74	1975-79	1980-84	1985	1986	1987	1988	1989	1990	
Indian	Albacore	Taiwan PC	11	11	16	9	28	42	41	19	40	? F
	Bigeye	Korea, Taiwan PC , Japan	16	33	37	43	47	49	54	40	43	F
	S. bluefin[a/]	Japan, Australia	50	38	43	35	27	26	23	19	16	D
	Skipjack	Maldives, Spain, France, Indonesia	38	34	63	137	149	169	205	238	221	L or M
	Yellowfin	Spain, France, Oman, Taiwan PC	30	38	55	101	118	129	180	154	180	F
	Billfishes and swordfish	Taiwan PC , Sri Lanka, India, Japan	6	7	10	17	18	18	18	16	14	Swordfish: M
Total principal tunas, billfishes and swordfish			151	161	224	342	387	433	521	486	514	
Small tunas and seerfishes		India, Sri Lanka, Pakistan, UAE, Yemen, Iran	56	86	140	214	221	262	278	278	285	
TOTAL INDIAN OCEAN			207	247	364	556	608	695	799	764	799	

a/ Includes s. bluefin tuna caught in the Pacific and Atlantic

Symbols: ? - uncertain or unknown, L - lightly exploited, M - moderately exploited, F - mainly to fully exploited, O - overexploited and D - depleted

Catches ('000 t)	1970-74	1975-79	1980-84	1985	1986	1987	1988	1989	1990
Total all oceans principal tunas, billfishes and swordfish	1456	1817	2040	2256	2527	2558	2834	2837	2908
Total all oceans small tunas and seerfishes	484	541	793	941	948	1063	1213	1260	1315
Total all tunas and tuna-like fishes	1940	2358	2833	3197	3475	3621	4047	4097	4223

Symbols: ? - uncertain or unknown, L - lightly exploited, M - moderately exploited, F - mainly to fully exploited, O - overexploited and D - depleted